SOP GYRE-007R
Auxiliary Plant Operations (Gyre)

1.0 Introduction
2.0 Responsibility
3.0 Procedures
- **3.1** Fuel Oil Transfer Pump (FOTP)
- **3.2** Engine Room Ventilation Fans
- **3.3** Oily Water Separator (OWS)
- **3.4** Fuel Oil Purifier (FOP)
- **3.5** Air Compressors
- **3.6** Reverse Osmosis Water Maker Plant
- **3.7** Chill Water Air Condition System
- **3.8** Bow Thruster
- **3.9** Generator
- **3.10** Sewage Treatment Plant

Revision/ Review Log

Revision Date	Approved by	Reviewed by	Revision Details/ Proposal Notes
11 January 2010 Revision #5	Dr. Jim Brooks	HSE Manager: Sue McDonald	
15 October 2010 Revision #6	Dr. Jim Brooks Dr. Bernie Bernard	HSE Manager: Russell Putt Port Captain: Capt. Pat Fallwell	Changed to electronic format

1.0 Introduction

This Standard Operating Procedure (SOP) describes the vessel's auxiliary mechanical systems and their basic operations. Details of auxiliary system operations are detailed in the manufacturer's manuals. The following systems are identified as auxiliary on board the *R/V GeoExplorer*.

- Fuel oil transfer pump
- Engine room ventilation fan
- Oil water separator
- Fuel oil purifier
- Air compressors
- Reverse osmosis water maker plant
- Chill water air condition system
- Bow thrusters
- Generator
- Sewage treatment plant

2.0 Responsibility

The chief engineer is responsible for the operation, inspection and maintenance of all auxiliary systems. The chief engineer will delegate various inspection and maintenance duties to the engineering staff.

3.0 Procedures

Brief operating instructions for auxiliary plant systems are as follows.

3.1 Fuel Oil Transfer Pump (FOTP)

Start Up

- Take soundings on each tank involved in operation
- Open the appropriate valves on the fuel oil manifold
- Press start button on the FOTP
- Continuously monitor each tank by soundings
- To fill the starboard side day tank
  - Take sounding on each tank involved in operation
  - Utilize sight glass on day tank
  - Open appropriate valves on the fuel oil manifold
  - Monitor each tank by sounding he sight glass on day tank

- Once the desired amount of fuel has been transferred, secure the system and shut down the FOTP

Shut Down

- Press stop button on FOTP
- Secure all valves opened at fuel oil manifold
- Record in appropriate engineering logs and fuel oil logs

3.2 Engine Room Ventilation Fans- Port and Starboard

Start Up

- Ensure that the main breaker in the main switch board is turned on
- Switch on the main switch board
- On the main switch board
  - Monitor Kw meter to verify normal parameters

Shut Down

- Switch off on blower control boxes in engine room

3.3 Oil Water Separator (OWS)

Start Up

- Ensure all manual valves leading to and from the OWS are open
- Place the power switch to the on position
  - The clean water inlet solenoid valve should open and fill the separator with clean water
- If the system has been shut down for longer than 3 days perform a back flush
  - Set operations switch to the flush position
  - Let the system back flush for 5 minutes
  - Set operation switch to off
  - Set power switch to off position
  - Repeat stem number 2 and continue
- Set the operation switch to the run position
  - Run position is normal operating condition
- When desired level in bilge is reached set the operation switch to off
- Clean system by back flushing

- Set operation switch to the flush position
- Let the system back flush for 30 minutes
- System is ready to shut down

Shut Down

- Set operations switch to the off position
- Close all manual valves leading to and from the OWS

3.4 Fuel Oil Purifier (FOP)

Start Up

- Check oil level in crank case
- Ensure that break is disengaged – bowl should be free
- Open delivery valve to port side day tank
- Start FOP at FOP local control box
- Once FOP reaches normal speed
  - Open fresh water prime valve and prime FOP
  - Open suction valve from starboard day tank
  - Regulate the inlet valve on FOP to control flow from fuel tank
- Check flow meter to verify amount going to day tank

Shut Down

- Close all suction valves opened at the beginning of this procedure
- Flush FOP with fresh water
- Stop FOP at FOP local control box
- When FOP has stopped completely, shut off delivery valve to day tank

3.5 Air Compressors #1, 2 and 3

Start Up

- Set local control box switch to on
- Work in auto mode
  - Pressure switches regulate tank pressure

Shut Down

- Set local control box switch to off

3.6 Reverse Osmosis Water Maker Plant

Start Up

- Set all valves as per manual start up positions
- Open raw water inlet valve
- Start the LP boost pump
- When flow through the reject discharge flow meter appears to be free of air bubbles, slowly turn the HP by-pass valve in a clockwise direction until reaching 800 PSI, do not permit the unit to exceed 1000 PSI
- Periodically monitor the control panel
- o Adjust as needed to maintain correct pressure and flow
- Once RO has produced the desired amount of potable water, shut down

Shut Down

- Release pressure on the system by turning the HP by-pass valve counter clockwise
- Secure the HP pump by pressing the LP pump stop button
- Set all valves as per manual stand-by positions

3.7 Chill Water Air Condition System

Start Up

- Ensure all service valves are open
- Check condenser cooling water level in expansion tank
- Ensure chilled water is full with a topping water pressure of 20 PSI
- Check compressor crankcase oil level via sump sight glass
  - o Level should be one half to three fourths of sight glass
- Start chilled water pump
- Turn on system start/stop toggle switch.

Shut Down

- Turn off system start/stop toggle switch.

- Stop the chilled water pump
- Close all service valves
- System is now secure

3.8 Bow Thruster

- Bridge start/stop button.
- Check oil level of hydraulic tank.
- Start locally or by bridge control-pushing start button
- Operation control located at the wheelman control station
  - Direct thrust port or starboard using bow thruster steering switch

Shut Down

- Bridge start/stop button secures electric motor.

3.9 Generator

Start Up

- Check oil level in crankcase
- Check water level of expansion tank
- Make sure fuel valve are in line
- On main switch board
  - Set idle/run switch to idle
  - Set on/off switch to on
  - Set speed trim dial to idle speed position (all the way counter-clockwise)
  - Set voltage control switch to automatic position
  - Set para/non para switch to on position
  - Set ammeter switch to on position
- Start generator, let run for ten minutes
  - Monitor oil pressure at 60 PSI
  - Monitor water temperature 210 max
  - Monitor fuel oil pressure at 20 PSI
- On main switch board
  - Set idle/run switch to the run position
  - Adjust the speed trim dial to 60.4 Hz (turn clockwise to increase)
  - Set synchronizer selector switch to incoming generator
  - Monitor synchroscope speed and direction
  - Adjust speed trim dial to achieve proper direction (clockwise) and speed (very slow) of synchroscope

- When synchroscope is at 12 o'clock position switch on the breaker for the incoming generator
- Incoming generator is now in parallel with the outgoing generator
- On main switch board
  - Monitor voltage at 480
  - Monitor cycles at 60 Hz

Shut Down

- When satisfied that all parameters are normal on the main switch board
  - Set speed trim dial to idle speed position (all the way counter-clockwise)
  - Breaker will automatically switch to the off position
  - Set on/off switch to off
  - Set idle/run switch to idle

3.10 Sewage Treatment Plant

Start Up

Before Initial startup, all access hatches should be removed and the inside of all tanks inspected. After inspection, replace all hatches securely. All filter grating must be in place, and all piping connections should be secured and correctly connected. Once inspected, proceed as follows.

- Remove cover on top of aeration tank and fill both the aeration tank and biological filter with clean water.
- Open both filter filling air vent valves and leave open until water begins seeping out and all air has been vented.
- Continue filling unit until water begins flowing into chlorine contact chamber.
- Line up the overhead discharge valves. (Be sure all drain valves are closed.)
- If an overboard discharge pumping system has been installed, continue to fill the unit until enough water accumulates in the chlorine contact chamber to energize the pump level control. This procedure will also serve to check the discharge pumping system.
- Replace all open hatches.
- Switch on the blower.
- Using the information provided on table 2 of the user manual, fill the chlorine chemical solution tank using the appropriate solution of bleach and adjust the pump dial to the proper setting.

- Wear rubber gloves and splash-proof goggles when handling bleach.
- Follow the bleach handling guidelines given in section 4.2 of the user manual and read the MSDS sheet for bleach.
- The chlorine residual should be 0.5 mg/l after two days of operation. Adjustments may be made as required to maintain desired chlorine residual, by adjusting the dial on the chemical injection pump, or the strength of the bleach solution. Start at the lowest setting and increase gradually.

Shut Down

When leaving the vessel unattended for more than a month, the sewage treatment unit should be shut down. Ideally, the sewage treatment unit aeration tank and biological filter should be drained and flushed out with clean water. However, the unit may be secured and left full of clean water if desired, by following the procedures below:

- Shut off toilets or bypass treatment system to prevent fresh inflow into the unit.
- Connect water hose to the 1 inch shutdown purge valve.
- Leave blower and chlorine pump running.
- Crack open hose valve so that about 1-2 GPM of clean water will flow continuously through the unit.
- Continue the clean water purging and aeration of the unit for at least 4 to 8 hours. This procedure will oxidize, dissolve and flush the biological sludge so that the system will not become septic.